GRINDER PUMP STATION

ITEM 4075

PART 1 – GENERAL

WORK INCLUDED: (Sec. 01) Furnish Grinder Pump Station(s) as indicated on Drawings and specified.

RELATED WORK: (Sec. 02)

Furnished/paid for in this Item:

Polyethylene Pressure Pipe
PVC Pressure Pipe
Polyethylene lateral kits

All freight and delivery costs, and unloading at the location designated by the Owner

DESCRIPTION: (Sec. 03) Work generally includes furnishing complete factory built Grinder Pump Station(s), series 2OOO as manufactured by Environment One or equal, each consisting of grinder pump in a basin, pump removal system, shut-off valve, anti-siphon valve, and check valve assembly within the basin, remote electrical alarm and control panel model 250-1 or 260-1 and all necessary internal wiring and controls. Each pump unit shall also include 75 L.F of 240-V direct buried cable. Each unit shall also include a complete 1¼" H.D.P.E. SDR-11 service connection kit complete.

The pumps shall be capable of delivering 11-15 gpm against a rated total dynamic head of between 0 & 117 feet TDH. At zero head, the output shall be 15 gpm minimum. The pump(s) shall be capable of intermittent (3 minute minimum) operation at any head up to 150% of normal rated dynamic head. The pumps must be capable of operating at negative total dynamic heads of 150% below normal rated dynamic head without installation of in line restrictive piping or valving as to create a false apparent head. The electrical rating of each pump shall be 8 amperes, 1 phase, 240 volt, 60 hertz.

QUALITY ASSURANCE: (Sec. 04) Material shall be new and of the best quality.

FACTORY TEST: (Sec. 05) Each grinder pump shall be submerged and operated for 5 minutes (minimum). Included in this procedure will be the testing of all ancillary components such as, the anti-siphon valve, check valve, discharge line, level sensors, each unit's controls, etc. All factory tests shall incorporate each of the above listed items. Actual appurtenances and controls which will be installed in the field, shall be particular to the tested pump only, a common set of appurtenances and controls for all pumps will not be acceptable. Certified test results shall be supplied showing the operation of each grinder pump at three different points on its curve, with the maximum pressure no less than 50 psi. Grinder pump shall be tested for water tightness up to 5 psig. The Engineer reserves the right to inspect such testing procedures with representatives of the Owner, at the named Grinder Pump Manufacturer's facility.

REFERENCES: (Sec. 06)

NEMA - National Electrical Manufacturers Association
NEC- National Electric Code
ODOT- Ohio Department of Transportation, Construction and Material Specifications

SUBMITTALS: (Sec. 07)

Shop Drawings – See General Conditions.

Operating Instructions, Parts List, etc. – See General Conditions. Provide six sets.

DELIVERY, STORAGE, HANDLING: (Sec. 08) Units shall be delivered to the job site, 100% completely assembled, ready for installation.

Each unit shall have lifting eyes to facilitate unloading.

Store in a dry, weatherproof location.

Handle with care so as not to damage units.

MEASUREMENT/PAYMENT: (Sec. 09) Payment per each, complete, delivered and stored.

WARRANTY: (Sec. 10) See General Conditions.

PART 2 – PRODUCTS

MANUFACTURERS: (Sec.11) Environment/One, Schenectady, New York, Model 2000, Series or equal.

MATERIALS/EQUIPMENT: (Sec. 12)

Pump:

Semi-positive displacement grinder pump with integral, vertical rotor, motor driven, solids handling pump, progressing cavity type with mechanical seal.

Rotor shall be through-hardened, highly polished, precipitation hardened stainless steel.

Stator shall be a compounded ethylene propylene synthetic elastomer, suited for domestic wastewater service. Its physical properties shall include resistance to high tear and abrasion, grease, water and detergents, and have a temperature stability, good aging properties and outstanding wear resistance.

Grinder

The grinder shall be placed immediately below the pumping elements, be direct-driven by a single, one-piece motor shaft. The grinder impeller assembly shall be securely fastened to the pump motor shaft. The grinder will be of the rotating type with a stationary hardened and ground chrome steel shredding ring spaced in accurate close in annual alignment of the driven impeller assembly, which shall carry two hardened type

400 series stainless steel cutter bars. This assembly shall be constructed so as to eliminate clogging and jamming under all normal operating conditions including starting. Sufficient vortex action shall be created to scour tank free of deposits or sludge banks which would impair the operation of the pump. These requirements shall be accomplished by the following, in conjunction with the pump:

1. The grinder shall be positioned in such a way that solids are fed in an upward flow direction.
2. The inlet shroud shall have a diameter no less than 5 inches.
3. At maximum flow the average inlet velocity must not exceed 0.2 feet per second.
4. The impeller mechanism must rotate at a nominal speed of no greater than 1800 rpm.

The grinder shall be capable of reducing all components in normal domestic sewage, including a reasonable amount of “foreign objects”, such as paper, wood, plastic, glass, rubber and the like, to finely-divided particles which will pass freely through the passages of the pump and the 1-1/4 inch diameter discharge piping.

Electric Motor

The electric motor shall be a one rpm, 1725 rpm, 240 volt, 60 hertz, single phase, capacitor start, ball bearing, squirrel cage induction type with a low starting current not to exceed 36 amperes and high starting torque of 8.4 foot pounds. Inherent protection against running overloads or locked rotor conditions for the pump motor shall be provided by the use of an automatic0reset, integral thermal overload protector incorporated in the motor. Two overload thermal units shall be provided, one in each ungrounded motor lead. This motor protector combination shall have been specifically investigated and listed y Underwriters’ Laboratories, Inc., for the application.

Mechanical Seal

The core shall be provided with a mechanical shaft seal to prevent leakage between the motor and pump. The seal shall have a stationary ceramic seat and carbon rotating surface with faces precision lapped and held in position by a stainless steel spring.

Tank

The tank shall e provided with a mechanical shaft seal to prevent and shall have nominal wall thickness of 3/16 inch and a capacity of 120 gallons. The tank shall be furnished with one PVC bolt on closet inlet flange to accept a six inch nominal PVC DWV pipe.

Accessway

The accessway shall be an integral extension of the FRP tank and shall be custom molded of fiberglass reinforced polyester resin and shall have a minimum wall thickness of 3/16 inch and a length of 4’-0”. It shall have an access opening at the top to accept a lockable domed fiberglass cover with skirt. The accessway shall include the following factory installed items: Copper 1-1/4 inch male pipethread, and a two inch PVC internal vent for venting the tank. Internal wiring shall terminate in a sealed junction box, that is

integral with the accessway the suitable for outdoor use. All seals shall be factory tested to ensure their watertight integrity.

Provide two padlocks, with keys, for each installation, one for tank, one for control panel.

Core Unit

The Grinder pump shall have cartridge type easily removable core assemblies containing pump, motor, grinder, controls, check valve, anti-siphon valve and wiring. Unit shall have means for local disconnection of motor and alarm wiring, either internal disconnect switches or weatherproof plug/receptacle combinations. The watertight integrity of the core unit, including wiring and access cover, shall be established by 100% factory test at a minimum of 5 psig.

The core unit shall have two lifting eyes provided in the top housing. All mechanical and electrical connections shall provide easy disconnect accessibility for core unit removal and installation. All maintenance tasks for the grinder pump station shall be possible without entry of the grinder pump station.

Level Controls

Wastewater level detection for controlling pump operation shall be accomplished by monitoring the pressure changes in an integral air-bell level sensor connected through air-tight tubing to a pressure switch. The level detection device shall have no moving parts in direct contact with the wastewater. Overflow sensing shall be accomplished by a separate air-bell sensor of the same type. Three pressure setpoints shall be provided,

1. to start pump operation,
2. to stop pump operation, and
3. to sense overflow condition (high-high level).

Each level control shall have its own built-in fail safe design which will prevent the entrance of moisture in case of switch diaphragm failure. The start/stop switch shall be internally connected to the integral motor run contactor. The high-high level switch shall be an isolated contact wired independently to an external alarm circuit, as indicated in the Electrical Drawings.

Alarm/Disconnect Panel

250-1 or 260-1 Panels with 75’ of 240-V cable as provided by Environment One or equal.

Corrosion Protection

All materials exposed to wastewater shall have inherent corrosion protection: ie., cast iron, fiberglass, stainless steel, PVC.